

**CRITERIA FOR DESIGN OF SAMPLING PLANS FOR
AMMONIUM AND SALINITY
Hawaii State Department of Health
Environmental Planning Office
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Because ammonium values are highly variable over both space (the area sampled) and time (consecutive samples collected at a single station), the initial goal of the sampling effort must be to describe the background salinity/silicate pattern in the entire area of interest, not just close to the shoreline.

Salinity/silicate pattern: If the mean value of at least 15 salinity measurements distributed over the area of interest at least 2 m from the shoreline is >32.000 ppt and ≤ 34.400 ppt, then the ammonium criterion applicable to the area is equal to 8.00 micrograms/L (the 50 % “not to exceed” geometric mean value). If the mean salinity is >34.400 ppt the ammonium criterion applicable to the area is equal to 4.00 micrograms/L (the 50 % “not to exceed geometric mean value”). Corresponding silicate guidelines are ≥ 200 micrograms/L for the lower salinity category and <200 micrograms/L for the higher salinity category, and, as mentioned above, the silicate categories are meant to be used as a “tiebreaker” for choosing the correct ammonium criterion to apply in cases where the mean sample salinity is at or very near 34.400 ppt. Sampling plans submitted to the Department of Health for review will be evaluated against these criteria:

1. For sampling purposes, “shoreline” means the location of the average wash of the waves at the time of sample collection. Paired salinity and silicate measurements ($N \geq 15$) should be taken at least 2 m offshore so that stable background levels are measured rather than the more variable condition close to shore where mixing is incomplete. Please note that salinity-silicate measurements need only be performed once for an area, during dry weather, and do not need to be repeated unless a major land use change affecting drainage in the area has occurred since the last set of measurements was taken.

Salinity/silicate measurements are not necessary if the salinity category for the area has already been identified in this report or can be determined from other existing data sets (theoretical arguments will not be accepted; actual data are required for these determinations).

2. If you must prepare a salinity/silicate sampling plan in order to select the appropriate ammonium criterion for the area of the proposed project, the same stations may be used for ammonium sampling, or you may choose different stations, provided that the entire area to be affected by the project is covered. If the project includes the shoreline, identify the shoreline at the time of sampling as the line marking the average wash of the waves, then move seaward over a distance of at least 2 m before collecting your samples for ammonium determinations. Please measure the salinity corresponding to each ammonium sample.

3. If the sampling plan is required for a proposed coastal development, sample near the water surface (about 20 cm below the water surface) and near the bottom at 4 – 6 points along a transect perpendicular to shore out to either 500 m or 1000 m offshore. Results of this exercise will identify the area as conforming to either the 4.00 micrograms/L or the 8.00 micrograms/L ammonium criterion. If a beach area is being sampled, sample along the entire beach, not just at one end or in the middle. Run a sufficient number of transects to cover the entire frontage of the proposed development. If the area of interest is seaward of the reef, design a sampling plan that covers the entire area to be affected by the proposed project.
4. Taking two or three water samples near the shoreline will not be considered sufficient to evaluate areas of coastal waters adjacent to proposed developments or proposed permitted discharges; please ensure that your sampling protocols cover the entire area affected by the proposed project or discharge.
5. Please remember that single sample values should not be compared to the WQS; the WQS are geometric means that, because of underlying variability in surface water chemistry, are used to evaluate geometric means computed from data sets containing analytical results from at least 10 independent water samples from an area.
6. QA/QC: Please screen your water samples before analysis to remove any macroscopic biota, such as algal fragments, that may have been picked up during sampling.